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PALEONTOLOGY.—*A Cotylosaur from the Upper Triassic of western Texas.*[1] E. C. CASE, University of Michigan.

The expedition from the Museum of Geology of the University of Michigan to the Upper Triassic beds of western Texas, in the summer of 1927, recovered a small fragment of a lower jaw which proves to be that of a Cotylosaur of the family Procolophonidae. The specimen, number 2338 of the Museum collection, is the type of a new genus and species for which the name *Trilophosaurus buettneri* is proposed. The specimen is of peculiar interest in that it is the first evidence of the presence of Cotylosauria in North America in Triassic time.

The fragment contains three complete teeth and the roots of four others. The first tooth was small and cylindrical, as shown by the broken root, behind this the teeth are set transversely in the jaw and increase in size regularly toward the rear. The three complete teeth are very similar. The teeth are obscurely thecodont in insertion; they appear to be acrodont and the fibres of bones can be seen running from the root to the wall of the alveolus. Only when the teeth are broken does the root and the alveolus become apparent. This peculiarity of attachment is a characteristic of the family, as all workers upon the various genera have noted it or have been bothered by it in describing the specimens. The complete teeth show a thin upper cutting edge, divided into three lobes by slight depressions in the edge. The sides swell out slightly and then contract sharply to the root. The upper teeth fitted between the lower teeth when the jaws were closed, interlocking closely.

Fig. 1.—*Trilophosaurus buettneri* Case, n. gen. and sp., fragment of lower jaw, oblique view from above downward and backward (× 2).

[1] Received February 23, 1928.

In the other members of the family, *Procolophon* and *Thelegnathus* (?) from South Africa, *Telerpeton* from Elgin in Scotland, and *Sclerosaurus* and *Koilioskiosaurus* from Germany, the transverse expansion of the teeth is shown in varying degree. In *Telerpeton* the cutting edge is divided into two lobes. The nearest group which shows a similar arrangement of the teeth is the Cotylosaurian family Diadectidae from the Permian beds of North America.

BOTANY.—*New plants from Central America.—XII.* PAUL C. STANDLEY, U. S. National Museum.[1]

Descriptions of further representatives of the family Rubiaceae are presented here. There are proposed eight new species of *Hoffmannia*, a genus whose species seem to be almost unlimited in the mountains of Costa Rica, where the group is best developed. Most of the forms seem to be of very local distribution, hence it may be expected that a good many others will be discovered by new explorations.

Hoffmannia Valerii Standl., sp. nov.

Branched shrub 1–1.5 m. high, the older branches subterete, 6–8 mm. thick, the young branches subterete, their internodes 3.5–5.5 cm. long, when young densely villous with slender spreading pale hairs; stipules rounded, scarcely over 1 mm. long, caducous; petioles slender, 1–2 cm. long, villous; leaf blades elliptic or ovate-elliptic, 6.5–11 cm. long, 3.5–5.5 cm. wide, acute or acuminate with acute or obtuse tip, at base obtuse or rounded and abruptly or gradually decurrent, membranaceous, deep green on the upper surface, when young sparsely villous but soon glabrate, beneath somewhat paler, marked with numerous short linear cystoliths, villous along the nerves with slender, pale or brownish, spreading hairs, the costa and lateral nerves prominent beneath, the lateral nerves slender, ascending, arcuate, anastomosing very close to the margin; inflorescences cymose, few-flowered, dense, axillary, fasciculate, sessile or nearly so (peduncles in fruit sometimes 1 cm. long), the bracts caducous; pedicels 2–5 mm. long, glabrous or nearly so; hypanthium turbinate, 2 mm. long, glabrous or bearing a few short hairs; calyx lobes 4, narrowly triangular, 1 mm. long, acute or obtuse, sometimes bearing dorsally a few short hairs; corolla in bud lance-ovoid, acutish, 5–6 mm. long, short-villous, the 4 lobes triangular-oblong, obtuse, 3 times as long as the tube; fruit subglobose, 6 mm. long, bright red, glabrous; seeds minute, subglobose, dark brown, coarsely and deeply pitted.

Type in the U. S. National Herbarium, no. 1,206,194, collected at El Arenal, Guanacaste, Costa Rica, altitude 600 meters, March 20, 1923, by Juvenal Valerio (no. 57). The following collections are from Guanacaste.

COSTA RICA: El Arenal, in wet forest, *Standley & Valerio* 45217. Los Ayotes, alt. 600 m., *Standley & Valerio* 45437.

This species is well marked by the villous nerves of the leaves and by the very short corolla tube.

[1] Published by permission of the Secretary of the Smithsonian Institution. For the last preceding paper of this series see THIS JOURNAL 18: 160. 1928. Received December 9, 1927.

Hoffmannia inamoena Standl., sp. nov.

Simple erect shrub 1–1.5 m. high, the stems stout, subterete, with short or elongate internodes, the young branches densely and minutely puberulent; stipules ovate, 1.5 mm. long, caducous; leaves opposite, the petioles slender, 1–4.5 cm. long, densely puberulent; leaf blades chiefly elliptic, sometimes ovate-elliptic, rarely oblong-ovate, 8–20 cm. long 3.5–10 cm. wide, abruptly acute or acuminate, rarely long-acuminate, with acute or obtuse, often falcate tip, at base obtuse to rounded and abruptly long-decurrent, membranaceous, green and glabrous above, beneath paler, densely and minutely puberulent beneath upon the nerves and sometimes, at least when young, over the whole surface, the costa stout, prominent, the lateral nerves slender, about 16 on each side, divaricate, usually arcuate, anastomosing to form a distinct collective nerve close to the margin, the ultimate nerves prominulous, closely reticulate; flowers fasciculate in the leaf axils or in sessile or short-pedunculate, 2 to 4-flowered cymes, the pedicels in fruit 1–4 mm. long, short-villous; calyx lobes 4, triangular-oblong, 1–2 mm. long, obtuse, short-villous; fruit subglobose, 6–7 mm. long, white, juicy, copiously villous; seeds minute, dark brown, coarsely and deeply pitted.

Type in the U. S. National Herbarium, no. 1,254,102, collected in wet forest at Los Ayotes, near Tilarán, Guanacaste, Costa Rica, altitude 600 meters, January 21, 1926, by Paul C. Standley and Juvenal Valerio (no. 45421). The following collections from Guanacaste may be cited:

COSTA RICA: Los Ayotes, *Standley & Valerio* 45432, 45345, 45529. El Arenal, alt. 500 m., *Standley & Valerio* 45214, 45181. Quebrada Serena, *Standley & Valerio* 46270, 46170, 46195.

Although flowers have not been collected, this plant is evidently distinct from all species of *Hoffmannia* previously described from Costa Rica. It is recognizable by its pale (when dried) leaves and the minute dense puberulence of the nerves.

Hoffmannia subauriculata Standl., sp. nov.

Decumbent shrub 1–1.5 m. long, the young branches obtusely quadrangular, glabrous, the internodes 5–7.5 cm. long; leaves opposite, sessile, elliptic-obovate, 15–22 cm. long, 7–9.5 cm. wide, abruptly short-acuminate, abruptly narrowed near the base into a petioliform portion about 2 cm. long and 1.5–2 cm. wide, rounded to subcordate at the base and amplexicaul, membranaceous, glabrous, deep green above, somewhat paler beneath, furnished with numerous minute cystoliths, the costa prominent beneath, stout, the lateral nerves about 15 on each side, slender, prominent, divaricate, strongly arcuate, anastomosing close to the margin; inflorescences borne on the naked older branches below the leaves, lax, many-flowered, cymose-paniculate, on slender peduncles 6.5–9 cm. long, the panicles about 5 cm. long, glabrous; bracts deciduous; pedicels slender, 6–12 mm. long; fruit oval or subglobose, 2-celled, bright red, glabrous, about 8 mm. long; calyx lobes 4, deltoid, acutish, 1 mm. long, glabrous, erect; seeds minute, subglobose, brown, coarsely pitted.

Type in the U. S. National Herbarium, no. 1,306,554, collected in moist forest at El Muñeco, on the Río Navarro, Province of Cartago, Costa Rica, altitude 1,400 meters, March 6–7, 1926, by Paul C. Standley and Rubén Torres Rojas (no. 50956).

This species may be recognized by its sessile leaves with broad bases.

Hoffmannia piratarum Standl., sp. nov.

Shrub, the young branchlets stout, obtusely quadrangular, glabrous, the internodes 1.5–3 cm. long; stipules caducous; leaves opposite, the petioles slender, 2.5–4.5 cm. long, glabrate; leaf blades lance-oblong, 10.5–20 cm. long, 5–6 cm. wide, long-acuminate, the acumen narrow, long-attenuate, often falcate, the blades membranaceous, deep green above, glabrous, beneath paler, when very young sparsely short-villous with ferruginous hairs but soon glabrate, the costa prominent, rather stout, the lateral nerves 8 or 9 on each side, very slender, strongly ascending, arcuate, irregularly anastomosing close to the margin; inflorescences axillary, solitary or fasciculate, cymose, dense, few-flowered, 3 cm. long or shorter, the peduncles 2.5 cm. long or shorter, glabrous or nearly so, the bracts caducous; pedicels 2–5 mm. long, usually sparsely short-villous; hypanthium 3 mm. long, glabrous or sparsely short-villous; calyx lobes 4, triangular-oblong, 2–3 mm. long, acute, villous-ciliate with short hairs; corolla 1 cm. long, in bud oblong, obtuse, glabrous or with a few short hairs at apex, the tube obconic, 2 mm. wide at base, 5 mm. wide in the throat, the 4 lobes oblong-triangular, slightly shorter than the tube; fruit subglobose, 2-celled, 6 mm. long, glabrous; seeds minute, subglobose, dark brown, coarsely and deeply pitted.

Type in the U. S. National Herbarium, no. 579835, collected in wet forest in the Wafer Valley, Cocos Island, Costa Rica, altitude 200 meters or less, January, 1902, by H. Pittier (no. 16259).

This insular plant is related to *H. angustifolia* Standl. and *H. psychotriaefolia* (Benth.) Griseb., but differs from both in its ciliate calyx lobes.

Hoffmannia ramonensis Standl, sp. nov.

Shrub, the older branches stout, terete, the younger ones glabrous or nearly so, the internodes 2–6.5 cm. long; stipules caducous; leaves opposite, sessile or nearly so, obovate-oblong, 14–28 cm. long, 5.5–10 cm. wide, acute, gradually narrowed below the middle, then rather abruptly long-attenuate into a petioliform portion 3–6 cm. long, this 1.5 cm. wide or narrower, acute at base, the blades membranaceous, deep green and glabrous above, beneath paler, when very young densely tomentose with loose brownish hairs, in age glabrate except along the short-villous nerves, the costa slender, prominent beneath, the lateral nerves about 14 on each side, slender, prominent, divaricate, arcuate, anastomosing close to the margin, the lower surface marked with very numerous short linear cystoliths; cymes axillary, solitary or fasciculate, umbelliform, mostly 2 to 5-flowered, the peduncles stout, 6–15 mm. long, densely brown-tomentose, the bracts caducous; pedicels stout, 2–4 mm. long, densely villous-tomentose; hypanthium turbinate, 2.5–3 mm. long, brown-tomentose; calyx lobes 4, narrowly triangular, 1.5–2 mm. long, narrowed to an obtuse apex, brown-villous on the outer surface; corolla in bud oblong-ovoid, obtuse, 6–7 mm. long, obtuse, densely villous-tomentose with brown hairs; anthers linear, 5 mm. long, narrowed to the acutish apex.

Type in the U. S. National Herbarium, no. 861910, collected along the Río Barranca at San Juan, near San Ramón, Costa Rica, altitude 1,300 to 1,400 meters, April 25, 1913, by A. Tonduz (no. 17812).

Hoffmannia ramonensis is well marked by its large, essentially sessile leaves and densely tomentose inflorescence.

Hoffmannia dotae Standl., sp. nov.

Erect branched shrub 2.5–4.5 m. high, the young branches obtusely quadrangular, glabrous or sparsely villous, the internodes 2.5–10.5 cm. long; stipules caducous; petioles 2 cm. long or shorter, often marginate to the base, glabrous; leaf blades oblong-obovate to obovate-elliptic, 19–29 cm. long, 7.5–12 cm. wide, abruptly short-acuminate with acute or obtuse tip, narrowed toward the base and abruptly long-decurrent, membranaceous, deep green and glabrous above, paler beneath, marked with numerous short pale cystoliths, at first sparsely short-villous along the nerves but soon glabrate, the costa stout, prominent, the lateral nerves about 15–17 on each side, arcuate-divaricate, anastomosing close to the margin; cymes solitary or fasciculate in the leaf axils, lax, few-flowered, 5.5 cm. long or shorter, the peduncles sometimes 3.5 cm. long; bracts caducous; pedicels 4–12 mm. long, sparsely or densely short-villous; hypanthium turbinate, 4 mm. long, sparsely short-villous; calyx lobes 2.5–3.5 mm. long, unequal, triangular or narrowly triangular, narrowed to the obtuse or acutish apex, sparsely villous; corolla red below, yellow above, 15 mm. long, glabrous or sparsely villous on the lobes, acuminate in bud, the tube 4 mm. thick, the 4 lobes linear-lanceolate, equaling the tube; anther tips slightly exceeding the corolla tube; stigma oblong, much exceeding the anthers; fruit red, oblong, 8–9 mm. long, 4 mm. thick, 2-celled, sparsely villous; seeds minute, yellowish, shallowly and coarsely pitted.

Type in the U. S. National Herbarium, no. 1,253,172, collected in moist forest near Santa María de Dota, Province of San José, Costa Rica, altitude about 1,700 meters, December, 1925, by Paul C. Standley and Juvenal Valerio (no. 43277). Nos. 43286 and 43293, from the same locality, also represent this species.

Hoffmannia dotae is related to *H. josefina* Standl., which has a smaller corolla, denser inflorescence, and obtuse flower buds.

Hoffmannia trichocalyx Standl., sp. nov.

Large weak shrub, 1–2.5 m. long, often decumbent, the branches thick and stout, terete, ochraceous, rimose, the young branchlets obtusely quadrangular, their internodes 1–4 cm. long, thinly villous or often glabrous; stipules caducous; leaves opposite, the petioles slender, 1.5–7 cm. long, sparsely villous or glabrous; leaf blades elliptic to oblong-elliptic, rarely ovate or obovate, 12–26 cm. long, 4.5–10 cm. wide, abruptly acuminate with acute tip, cuneate to obtuse at base, usually abruptly contracted and short-decurrent, chartaceous, deep green and glabrous on the upper surface, beneath usually villous along the nerves but sometimes glabrate, the costa slender, prominent, the lateral nerves 10–14 on each side, divaricate, strongly arcuate, prominent, extending nearly to the margin; inflorescences pendent, borne on naked stems below the leaves, fasciculate, 2.5–14 cm. long, few or many-flowered, the peduncles long and slender, usually short-villous, dark red, the bracts deciduous; pedicels 3–6 mm. long, sparsely or densely villous; hypanthium turbinate, dark red, 4 mm. long, densely or sparsely villous; calyx lobes 4, broadly deltoid, acutish, 2 mm. long, sparsely or densely villous; corolla 1 cm. long, bright yellow or red and yellow, glabrous or sparsely villous outside, the tube 3 mm. thick, cylindric, the lobes triangular-oblong, narrowed to the obtuse apex, about equaling the tube; fruit 2-celled, oval, 8 mm. long, 5 mm. thick, dark red, glabrous or sparsely villous.

Type in the U. S. National Herbarium, nos. 1,305,242–3 (both from the same plant), collected in wet forest at Fraijanes, Province of Alajuela, Costa Rica, altitude about 1,600 meters, February 12, 1926, by Paul C. Standley and Rubén Torres Rojas (no. 47690). Additional collections are at hand, as follows:

COSTA RICA: Fraijanes, *Standley & Torres* 47819, 47480, 47924.

The nearest relative of this species is *H. leucocarpa* Standl., also Costa Rican, which has a glabrous inflorescence and white fruit.

Chomelia (?) sylvicola Standl., sp. nov.

Shrub, glabrous throughout, the branches slender, subterete, the older ones grayish, rimose, the younger ones green, smooth, the internodes 1.5–6.5 cm. long; stipules distinct, ovate-oval, 3 mm. long, obtuse, green, deciduous; leaves opposite, the petioles slender, 7–12 mm. long; leaf blades elliptic-oblong, 6.5–8 cm. long, 2.2–2.8 cm. wide, rather abruptly attenuate to an obtuse tip, acute and decurrent at base, subcoriaceous, deep green above, dull, the venation inconspicuous, beneath somewhat paler, domatiate in the axils of the nerves, the costa slender, prominent, the lateral nerves about 6 on each side, ascending, arcuate, irregularly and laxly anastomosing near the plane margin; inflorescence terminal, cymose-paniculate, open, rather few-flowered, the peduncle 2 cm. long, the branches slender, stiff, the bracts triangular, 1–1.5 mm. long, green; pedicels slender, 10–12 mm. long, stiff; fruit obovoid, terete, finely costate, about 18 mm. in total length and 7 mm. in diameter, acute at base, lustrous, prolonged within the calyx into a conic obtuse projection 4–5 mm. long, 2-celled, the endocarp hard and osseous; calyx persistent, cuplike, 2 mm. long, green, the margin undulate.

Type in the U. S. National Herbarium, no. 1,305, 902, collected in wet forest at Yerba Buena, northeast of San Isidor, Province of Heredia, Costa Rica, altitude about 2,000 meters, February 22, 1926, by Paul C. Standley and Juvenal Valerio (no. 49196).

It is improbable that this plant belongs to the genus *Chomelia*, especially in view of its terminal inflorescence, but I have not been able to refer it satisfactorily to any other group.

Guettarda poasana Standl., sp. nov.

Shrub or small tree 3–6 m. high, the branchlets stout, compressed, glabrous, the internodes short; stipules ovate, about 2 cm. long, long-acuminate, thin, brown, glabrous, deciduous; leaves opposite, the petioles slender, 2–7 cm. long, glabrous, the blades elliptic, broadly elliptic, or elliptic-ovate, 13–19 cm. long, 5–9 cm. wide, acutish to short-acuminate at base, short-acuminate at apex, membranaceous, green above, glabrous or when young very sparsely short-pilose, the venation mostly plane, paler beneath, appressed-pilose when young, glabrate in age, the costa and lateral nerves very slender, prominent, the lateral nerves 8 or 9 on each side, arcuate, extending nearly to the margin, the intermediate veins inconspicuous, the margin plane; peduncles 3 cm. long or shorter, glabrous, the cymes bifurcate, about 9-flowered, the branches short; flowers sessile, the bractlets minute; calyx and hypanthium together 2–2.5 mm. long, the hypanthium glabrous or nearly so; calyx shallowly dentate, puberulent or glabrous; corolla pink, densely tomentose outside, the tube 15–20 mm. long, 2.5 mm. thick in the throat, the lobes suborbicular, 4 mm. long.

Type in the U. S. National Herbarium, no. 1,305,283, collected in wet forest at Viento Fresco, on the slopes of Poás Volcano, Province of Alajuela, Costa Rica, altitude about 1,800 meters, February 13, 1926, by Paul C. Standley and Rubén Torres Rojas (no. 47807). The following additional specimens have been seen:

COSTA RICA: Valley of Río Poás, alt. 2,100 m., *Pittier* 2399. Las Nubes, Prov. San José, alt. 1,800 m., *Standley* 38755, 38777.

Closely related to *G. crispiflora* Vahl, which also occurs in Costa Rica but is distinguished by its pilose stipules and densely tomentose hypanthium

Guettarda Deamii Standl., sp. nov.

Tree 3.5–4.5 m. high, the branches blackish, lenticellate, the branchlets stout, densely short-pilose, the internodes short; stipules ovate-oblong, 2.5–4 mm. long, obtuse or acutish, appressed-pilose outside, soon deciduous; leaves opposite, the petioles stout, 5–9 mm. long, densely short-pilose; leaf blades mostly oval, sometimes oblong-oval or obovate-oval, 4–8.5 cm. long, 2.5–4.5 cm. wide, rounded at base, broadly rounded at apex, chartaceous, green above, densely short-pilose or pilose-scaberulous, the venation prominulous but more or less imbedded, beneath paler, densely velutinous-pilosulous, the costa and lateral nerves prominent, the lateral nerves 8–10 on each side, subarcuate, ascending at an angle of 50 degrees or more, the intermediate veins prominulous, laxly reticulate, the margin recurved; cymes subcapitate, 3 to 5-flowered, the peduncles very stout, 3–10 mm. long, densely short-pilose, the flowers sessile; bractlets subulate, 3–4 mm. long, persistent; fruit globose, about 8 mm. in diameter, 3 or 4-celled, minutely tomentulose.

Type in the U. S. National Herbarium, no. 796136, collected on mountain ridges near Gualán, Guatemala, altitude 185 meters, June 15, 1909, by C. C. Deam (no. 6271).

A relative of *G. macrosperma* Donn. Smith, which has chiefly acute leaves, with closely appressed pubescence.

Psychotria hondensis Standl., sp. nov.

Shrub 3 m. high, the young branches stout, greenish (older ones ochraceous), obtusely quadrangular, densely puberulent or pubescent with short spreading hairs, the internodes mostly 1.5–3 cm. long; stipules persistent, erect, stiff, short-connate, broadly triangular, narrowed to the obtuse apex, densely puberulent; leaves opposite, the petioles stout, 1.3–3.5 mm. long, puberulent; leaf blades broadly elliptic to elliptic-oblong, 17.5–29 cm. long, 6–15 cm. wide, narrowed to the acute to acuminate apex, often abruptly acuminate, acute or acuminate at base and often abruptly decurrent, membranaceous, deep green above, glabrous, the venation not elevated, beneath slightly paler, densely velutinous-pubescent with short spreading hairs, the costa and lateral nerves slender, prominent, the lateral nerves 9–11 on each side, ascending, usually at a wide angle, slightly arcuate, anastomosing close to the margin; inflorescence terminal, cymose-paniculate, erect, the peduncle stout, 4–5.5 cm. long; panicles open, rather few-flowered, 5–11 cm. broad, usually broader than long, the primary branches few, opposite or verticillate, stout, divaricate, pubescent with short spreading hairs; flowers sessile or nearly so; hypanthium semiglobose, 2 mm. long, densely pubescent with minute spreading hairs; calyx 2.5 mm. long, subtruncate, distantly and obscurely repand-dentate, the

teeth 5; corolla in bud 11 mm. long, densely puberulent-tomentose with fulvous pubescence, the buds obtuse; fruit subglobose, green, about 13 mm. in diameter, glabrate; pyrenes 2, 1 cm. long, nearly smooth dorsally, plane on the inner surface; seeds semiglobose, 7 mm. long, brown, deeply and narrowly sulcate from base to apex on the inner surface.

Type in the U. S. National Herbarium, no. 764151, collected in forests of the Río Hondo, Atlantic slope of Costa Rica, altitude 100 meters, August, 1901, by H. Pittier (no. 16161). The following are additional collections:

COSTA RICA: La Colombiana Farm, Province of Limón, alt. 70 m., *Standley* 36883, 36775.

This species is characterized by its large, broad, copiously pubescent leaves, and large fruit.

Psychotria Heydei Standl., sp. nov.

Young branches stout, subterete, densely villous with short spreading brownish multicellular hairs, the internodes short; stipules persistent, united to form a truncate interpetiolar sheath 3–4 mm. long, this densely short-villous; leaves opposite, the petioles stout, 1.5–4 cm. long, villous-tomentose; leaf blades elliptic-oblong, broadest at the middle, 11.5–26 cm. long, 5.5–10.5 cm. wide, acuminate, often rather abruptly so, at base obtuse to rounded, sometimes very shortly decurrent, thick-membranaceous, green above, villous-hirsute with slender yellowish hairs, beneath scarcely paler, densely villous-hirsute, the costa stout, prominent, the lateral nerves slender, prominent, about 15 on each side, arcuate-ascending, anastomosing very close to the margin, the intermediate nerves usually evident, coarsely reticulate; inflorescence terminal, cymose-paniculate, the peduncle stout, erect, 5.5–12.5 cm. long; panicles much branched, lax, many-flowered, 6–9 cm. long, 8–17 cm. wide, the primary branches opposite or verticillate, divaricate or reflexed, stout, densely villous-hirsute; bracts persistent, triangular-subulate, 7 mm. long or shorter, short-villous; flowers mostly sessile, but sometimes on pedicels as much as 8 mm. long; hypanthium 2 mm. long, densely villous; calyx 1.5–2 mm. long, 5-lobate, the lobes triangular, acutish; corolla funnelform, 13–14 mm. long, densely short-villous, the tube gradually widened upward, 3 mm. broad in the throat, the 5 lobes ovate, obtuse, 3 mm. long; anthers oblong-linear, nearly sessile, included, 3 mm. long.

Type in the U. S. National Herbarium, no. 939642, collected at Chiul, Department of Quiché, Guatemala, altitude 2,600 meters, April, 1892, by Heyde and Lux (no. 3173).

The dense pubescence and large panicles distinguish this plant among the Central American species of *Psychotria*.

Psychotria dispersa Standl., sp. nov.

Densely branched, erect shrub, 1–2 m. high, the branches slender, terete, green, the young branches usually densely pilose with short spreading whitish hairs, sometimes merely puberulent or glabrate, the internodes short or elongate; stipules green, persistent, connate into a sheath 2.5–3 mm. long, puberulent, the sheath bicuspidate on each side, the cusps 3–6 mm. long, linear, rigid, erect; leaves opposite, the petioles slender, 5–13 mm. long, minutely puberulent; leaf blades oblong-elliptic to rarely lance-oblong, 5–10.5 cm. long, 2–4 cm. wide, abruptly acuminate or long-acuminate, or cuspidate-acuminate, with acutish, often falcate acumen, narrowed to the acute, often decurrent

base, membranaceous, deep green above, puberulent or pilose along the elevated costa, elsewhere glabrous, beneath paler, pubescent on the nerves with minute spreading hairs, the costa slender, prominent, the lateral nerves very slender, 12–17 on each side, arcuate-ascending, laxly anastomosing close to the margin, the intermediate nerves evident, coarsely reticulate; inflorescence terminal but in age often appearing lateral because of the elongation of the branch, usually recurved, cymose-paniculate, the peduncles slender, 1.5–2.5 cm. long, pilose with spreading whitish hairs, the panicles 2–4 cm. long, 2–3.5 cm. broad, racemosely branched, the branches 1 cm. long or shorter, chiefly opposite, divaricate, green, hirtellous, few-flowered; bracts linear, green, 2–5 mm. long, those at the base of the flowers oblong, shorter; flowers sessile or nearly so; hypanthium subglobose, 0.8 mm. long, minutely pubescent; calyx 0.7 mm. long, shallowly 4 or 5-dentate, the teeth triangular, acutish; corolla funnelform, 3–3.5 mm. long, puberulent, the 5 lobes triangular-ovate, obtuse, 1 mm. long, spreading; anthers included; fruit subglobose 3 mm. long, bisulcate, bright blue, puberulent or glabrate; pyrenes 2, obtusely 5-costate dorsally, the inner face flat, with a narrow groove from base to apex.

Type in the U. S. National Herbarium, no. 1,254,170, collected in wet forest at Los Ayotes, near Tilarán, Province of Guanacaste, Costa Rica, altitude 600 meters, January 21, 1926, by Paul C. Standley and Juvenal Valerio (no. 45548). The following additional collections have been examined:

COSTA RICA: Los Ayotes, *Standley & Valerio* 45519. La Tejona, Prov. Guanacaste, alt. 600 m., *Standley & Valerio* 45819, 45938. Tilarán, Prov. Guanacaste, alt. 600 m., *Standley & Valerio* 44304. Boca de Zhorquín, Talamanca, alt. 50 m., *Tonduz* 8591. La Colombiana Farm, Prov. Limón, alt. 70 m., *Standley* 36640, 36855, 36963, 36748, 36651. Near Guápiles, Prov. Limón, alt. 300–500 m., *Standley* 37266. Pejivalle, Prov. Cartago, alt. 900 m., *Standley & Valerio* 46869, 46971. Turrialba, *Cook & Doyle* 371. El Silencio, Prov. Guanacaste, *Valerio* 145. El Arenal, Prov. Guanacaste, alt. 485 m., *Standley & Valerio* 45223. Peralta, *Stevens* 350. Quebrada Serena, Prov. Guanacaste, *Standley & Valerio* 46156, 46223. Hamburg Finca, Prov. Limón, *Standley & Valerio* 48749. Río Colorado near Turrialba, alt. 570 m., *Tonduz* 8288. Shirores, Talamanca, alt. 100 m., *Tonduz* 9320. Valley of Río Tuis, alt. 600 m., *Tonduz* 8136. Forests of Las Vueltas, Tucurrique, alt. 650–700 m., *Tonduz* 12888. Forests of Tuis, alt. 650 m., *Tonduz* 11463.

PANAMA: Changuinola Valley, *Dunlap* 228, 382. Farm 6, between the Changuinola and Sixaola rivers, *Rowlee & Stork* 1023. Lower Changuinola River, *Stork* 98.

GUATEMALA: Chamá, Alta Verapaz, alt. 450 m., *Johnson* 402.

Psychotria dispersa is a very common shrub of the lowland forests of Costa Rica, occurring on both continental slopes. It is rather handsome and conspicuous because of the small panicles of bright blue fruit. *P. dispersa* is closely related to *P. Pittieri* Standl., with which it has been confused heretofore. In the latter, a Panamanian plant, the pubescence of the lower surface of the leaves consists of longer, closely appressed hairs.

Psychotria bella Standl., sp. nov.

Young branches obtusely quadrangular, green, stout, densely pilose with slender, whitish, spreading or ascending hairs, the internodes 1.3–3 cm. long; stipules 1–1.5 cm. long, oval, soon deciduous, green, conspicuously nerved,

densely pubescent, shallowly bilobate at apex, the lobes obtuse; leaves opposite, the petioles slender, 2–3 cm. long, pilose with short spreading white hairs; inflorescence terminal, probably pendent, cymose-paniculate, the peduncle slender, 13 cm. long, thinly villous-pilose, the panicle about 6 cm. long and 8 cm. broad, the primary branches 2.5 cm. long or less, each bearing about 5 flowers; bracts pink, ovate or elliptic-ovate, 12–18 mm. long, acute, hirtellous on both surfaces; pedicels 4–6 mm. long, pilose with short slender spreading hairs; hypanthium obovoid, 2 mm. long, densely pilose; calyx campanulate, pink, 10–13 mm. long, deeply 5-lobate, the lobes oval-ovate, acute or obtuse, evidently nerved, 5–6 mm. wide, thinly pubescent; corolla funnelform, white, thinly hirtellous, the tube 18 mm. long, 2 mm. thick, the throat 4 mm. wide, the 5 lobes triangular-oblong, attenuate to the apex, about 8 mm. long, spreading or recurved; anthers partly exserted.

Type in the U. S. National Herbarium, no. 677646, collected in wet forest between Alto de las Palmas and top of Cerro de la Horqueta, Chiriquí, Panama, altitude 2,100 to 2,265 meters, March 18, 1911, by H. Pittier (no. 3250).

When growing this must be an unusually showy plant because of the large, brightly colored bracts and calyces, which differentiate it from all other Central American species of *Psychotria*.

BOTANY.—*Notes on some marine algae from Brazil and Barbados.*[1]

MARSHALL A. HOWE. (Communicated by WILLIAM R. MAXON.)
New York Botanical Garden.

In the summer of 1915, Dr. J. N. Rose of the United States National Herbarium, accompanied by Mr. P. G. Russell, visited the eastern coast of South America for the primary purpose of making collections of Cactaceae for use in connection with preparing the manuscript of the four-volume monograph on the Cactaceae by Doctors Britton and Rose. Incidentally, Dr. Rose and Mr. Russell, in the period from May 24 to August 18, 1915, collected on the coast of Brazil 67 numbers of marine algae, including the subsequent subdivisions of the original field numbers; and 14 numbers were picked up on the shores of Barbados on September 30, 1915. The study of this material shows it to be of sufficient interest to justify a brief report in regard to it.

Several lists of Brazilian algae have been published. The first, by de Martius,[2] in 1833, includes about 70 marine species, besides a few from fresh water. The longest list is that of de Martens[3] 1870, who, after reviewing critically the works of his predecessors and throw-

[1] Contributions from The New York Botanical Garden, No. 295. Received January 23, 1928.

[2] MARTIUS, C. F. P. DE. *Flora brasiliensis*, 1–50. 1833.

[3] MARTENS, G. DE. *Conspectus algarum Brasiliae hactenus detectarum*. Kjøb. Vid. Medd. 1870: 297–314. 1870.

ing out 18 Brazilian records as improbable, enumerates 166 marine species and 11 fresh-water species from Brazil. Two important and critical papers by Möbius,[4] in 1889 and 1890, added about 56 species to previously published lists. There are other papers of some importance, but those named are the principal, especially in regard to the marine forms.

The present collections of marine algae on the coast of Brazil include only 40 species, but two of them, representatives of the Rhodophyceous genera *Porphyra* and *Cottoniella*, appear to be new to science, and nine others; *Enteromorpha prolifera*, *Codium intertextum*, *Sargassum polyceratium*, *S. Filipendula*, *Padina Sanctae-Crucis*, *Dilophus guineensis* (?), *Gelidium pusillum*, *Wurdemannia setacea*, and *Jania capillacea* have apparently not before been reported for Brazil, although it is reasonably certain that some of them, like *Codium intertextum*, have lurked under other names.

The collection of marine algae made in Barbados by Dr. Rose and Mr. Russell includes only twelve species, gathered near the steamer landing on September 30, 1915, but it is remarkable for the large proportion of additions to the list of 215 species of marine algae of Barbados published by Miss Vickers[5] in 1905. After making allowance for two cases in which only a matter of nomenclature is involved, there appears to be seven additions to the Vickers list, viz., *Ulva rigida*, *Boodlea siamensis*, *Chaetomorpha brachygona*, *Neurocarpus Hauckianus*, *Laurencia papillosa*, *Jania capillaceae*, and *Fosliella Le Jolisii*. The most notable of these is *Neurocarpus Hauckianus*, now reported for the first time as occurring outside of the coast of Brazil. The same species however, was brought from Brazil by the same collectors on loose sheets in the same package (at least when they reached The New York Botanical Garden) and the possibility of a confusion of labels or specimens at some stage of the handling is to be kept in mind. Nevertheless, there is nothing unreasonable or improbable in such an extension of the known range of *Neurocarpus Hauckianus*. Similar extensions have been made for other species first described from Brazil. For example, *Acicularia Schenckii* (Möb.) Solms, originally described from Cabo Frio, Province of Rio de Janeiro, in 1889, has since been found

[4] MÖBIUS, M. *Bearbeitung der von H. Schenck in Brasilien gesammelten Algen.* Hedwigia **28**: 309–347. *pl. 10, 11.* 1889.

———. *Algae brasilienses a cl. Dr. Glaziou collectae.* Notarisia **5**: 1065–1090. *pl.* 1890.

[5] VICKERS, A. *Liste des algues marines de la Barbade.* Ann. Sci. Nat. Bot. IX. **1**: 45–66. 1905.

to occur on several of the West Indian islands, including Barbados[6] and ranging as far north as Bermuda. It is an interesting parallel that *Neurocarpus Hauckianus* (Möb.) Kuntze, originally described from Brazil by the same author in the same paper, now appears to have its known limits extended in a similar direction.

BRAZIL

CHLOROPHYCEAE

Family ULVACEAE

ULVA LACTUCA L.
Island of Paquetá, Rio de Janeiro Bay (20289); vicinity of Bahia (21301 g).

ULVA RIGIDA Ag.
Vicinity of Bahia (19609 a); Nictheroy, Rio de Janeiro (20316 a).

ENTEROMORPHA PROLIFERA (O. F. Müll.) J. Ag.
Vicinity of Bahia, 19672; Island of Coco, Rio de Janeiro Bay (20269 a); Nictheroy, Rio de Janeiro (20315).

Family VALONIACEAE

ANADYOMENE STELLATA (Wulf.) Ag.
Vicinity of Bahia (19609 b), a reduced form.

Family CLADOPHORACEAE

CHAETOMORPHA MEDIA (Ag.) Kütz.
Vicinity of Bahia (19610).

Family BRYOPSIDACEAE

BRYOPSIS HARVEYANA J. Ag.
Vicinity of Bahia (19606 a).

Family CAULERPACEAE

CAULERPA FASTIGIATA Mont.
Nictheroy, Rio de Janeiro (20318 a).

Family CODIACEAE

HALIMEDA OPUNTIA (L.) Lamour.
Vicinity of Bahia (19679 and 19682).

CODIUM DECORTICATUM (Woodw.) M. A. Howe.
Codium elongatum Ag.
Island of Coco, Rio de Janeiro Bay (20268); Island of Juparayba (20280).

CODIUM INTERTEXTUM Collins & Hervey
Vicinity of Bahia (21301 k).

Dr. O. C. Schmidt in his valuable paper "Beiträge zur Kenntnis der Gattung Codium Stackh"[7] considers *Codium intertextum* to be a synonym of *C. adhaerens* (Cabr.) Ag. and holds *C. difforme* Kütz. distinct from *Codium adhaerens*, of which many writers have made *C. difforme* a synonym. He states that there are three main distinctions, namely the firm-membranous thallus, smaller utricles, and smaller gametangia of *C. adhaerens*, as contrasted with the loose spongy thallus and larger utricles and gametangia of *C. dif-*

[6] Reported and figured under the name *Acetabularia caraibica* Kütz by Miss Vickers (Ann. Sci. Nat. Bot. IX 1: 58. 1905; Phyc. Barb. 1: *pl. 49.* 1908).

[7] Bibliotheca Botanica, heft 91. 1923.

forme. These comparative distinctions may hold good for European specimens, but it seems difficult to apply them to American representatives of the group, the characters of which are commonly intermediate. It seems to us necessary either to maintain *Codium intertextum* as a species, poorly defined though it may be, or to consider both *C. difforme* and *V. intertextum* as synonyms of *Codium adhaerens*. In the present specimen from the vicinity of Bahia, the utricles are mostly 60–152μ in maximum diameter; according to Schmidt those of *C. difforme* are 100–275μ, while those of *C. adhaerens* hardly exceed 75 μ.

PHAEOPHYCEAE

Family ENCOELIACEAE

COLPOMENIA SINUOSA (Roth) Derb. & Sol.
Island of Juparayba, Rio de Janeiro Bay (20278 b).

Family FUCACEAE

SARGASSUM POLYCERATIUM Mont.
Sargassum bahiense Kütz.
Vicinity of Bahia (19612, 19680 and 21301 a).

SARGASSUM CYMOSUM Ag.
Island of Coco, Rio de Janeiro Bay (20271); Island of Juparayba, Rio de Janeiro Bay (20278 a); Island of Paquetá, Rio de Janeiro Bay (20295); Ilha Grande, Distrito Federal, Rio de Janeiro (20395 a).

SARGASSUM FILIPENDULA Ag.
On beach, Copacabana, Rio de Janeiro (20888). A small, presumably long-natant fragment, overgrown with Bryozoa.

Family DICTYOTACEAE

ZONARIA VARIEGATA (Lamour.) Ag.
Vicinity of Bahia (21301 h).

PADINA VICKERSIAE Hoyt.
Padina variegata Hauck. Not *P. variegata* Gaill.
Padina Howeana Børg.
Island of Coco, Rio de Janeiro Bay (20270); Island of Juparayba, Rio de Janeiro Bay (20282 a); Ilha Grande, Distrito Federal, Rio de Janeiro (20397 c).

PADINA SANCTAE-CRUCIS Børg.
Vicinity of Bahia (19681 b.)

NEUROCARPUS HAUCKIANUS (Möb.) Kuntze
Dictyopteris Hauckiana Möb.
Vicinity of Bahia (19611 b, 19613, and 21301 c); Ilha Grande, Distrito Federal, Rio de Janeiro (20397 b).

NEUROCARPUS PLAGIOGRAMMUS (Mont.) Kuntze
Haliseris plagiogramma Mont.
Ilha Grande, Distrito Federal, Rio de Janeiro (20397 a).

DICTYOTA BARTAYRESII Lamour.
Nictheroy, Rio de Janeiro (20316 b).

DICTYOTA DENTATA Lamour.
Vicinity of Bahia (21301 j), in small quantity, with other algae.

DILOPHUS GUINEENSIS (Kütz.) J. Ag. (?)
Vicinity of Bahia (19606 b)—a fragment only, determination not certain.

RHODOPHYCEAE

Family BANGIACEAE

Porphyra Roseana sp. nov.

Densely cespitose, tawny-violet or olivaceous; thallus very shortly stipitate, usually with several successive convolute-spreading or cornucopioid laminae or divisions from common base, the main divisions suborbicular or broadly ovate to oblong or linear-oblong, mostly 1–3 cm. long, strongly crispate,

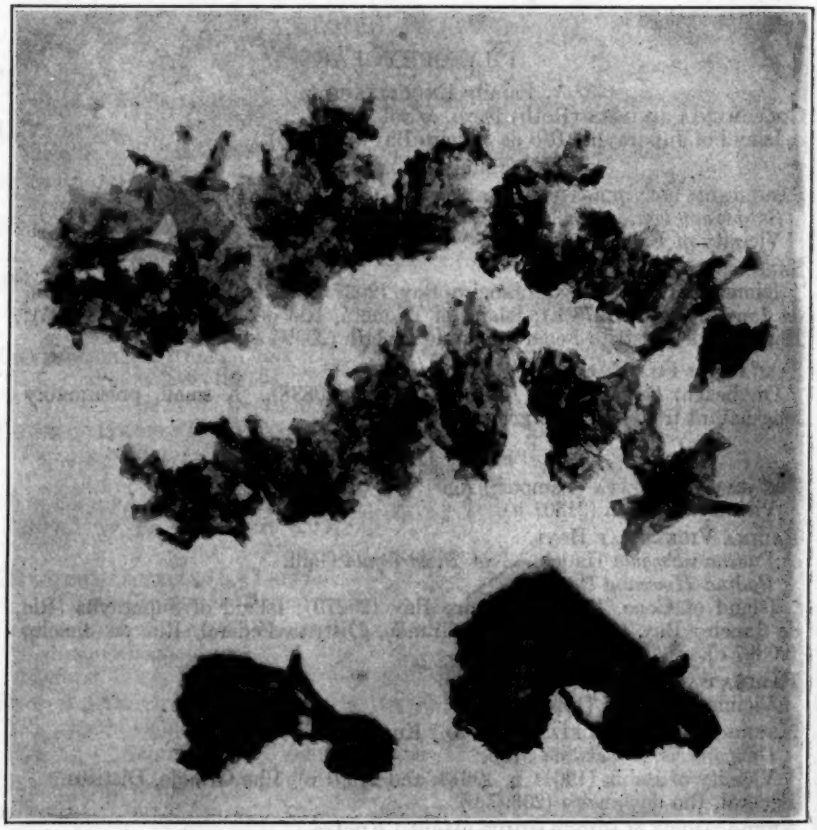

Fig. 1.—*Porphyra Roseana* M. A. Howe. Photograph of type specimens (*Rose & Russell* 20684), natural size.

monostromatic except at the extreme base, 20–30μ thick, rigid on drying and scarcely adhering to paper, the margins commonly lobulate or subdentate, the lobules often auricular, cucullate, cornute, or somewhat trumpet-shaped; cells mostly 13–25μ in maximum diameter in surface view, their protoplasts irregularly angular or sometimes fusiform, separated by spaces of 5–10μ, the

basal protoplasts flagellate-pyriform; cells in sections subquadrate, the superficial walls firm, 5–10μ thick; monoicous; antheridial sori narrowly marginal, 32 antherozoids in each antheridium; sporocarps forming submarginal sori, 8 carpospores in each sporocarp.

On *Balanus* sp. etc., in the vicinity of Cabo Frio, Province of Rio de Janeiro, Brazil, *J. N. Rose & P. G. Russell* (20684), August 8, 1915.

Porphyra Roseana is probably allied to the Japanese *P. suborbiculata* Kjellm. and *P. crispata* Kjellm., but differs amply from both of them in its rigid thallus, a character that is especially remarkable in view of its thinness. It is apparently also a smaller and thinner plant than either of these, with a more cucullate-convolute base, and more pronouncedly cucullate lobes. In general habit the plant bears some resemblance to Kjellman's figure 4[3] (plate 1) of *Porphyra crispata*, though only one-fourth or one-half the size of Kjellman's figure. The cells in surface view resemble those of *P. suborbiculata*, as shown in Kjellman's figure 5 (plate 2) and in cross-section they are of about the same form as those of the same species as shown in Kjellman's figure 4 (plate 5), but lamellations are not obvious, though sometimes faintly visible in a surface view of the uncut cells.

Family CHAETANGIACEAE

GALAXAURA MARGINATA (Ell. & Soland.) Lamour.
Ilha Grande, Distrito Federal, Rio de Janeiro (20396).

GALAXAURA OBTUSATA (Ell. & Soland.) Lamour.
Galaxaura moniliformis Kjellm.

Vicinity of Bahia (21301 n); a small reduced form, of "Cameratae" structure, with *Neurocarpus Hauckianus*, etc. The type of *Galaxaura moniliformis* Kjellm. was from Bahia; it is tetrasporic and shows the "Cameratae" structure. Kjellman's var. *brachyarthra* of *Galaxaura fragilis* Kütz. [= *G. oblongata* (Ell. & Soland.) Lamour] was also from Bahia, but its cortex is quite different from that of our present plant.

Family GELIDIACEAE

GELIDIUM CORNEUM (Huds.) Lamour.
Nictheroy, Rio de Janeiro (20317 b).

GELIDIUM PUSILLUM (Stackh.) Le Jolis.
Island of Coco, Rio de Janeiro Bay (20269 c), with *Hypnea spinella*, etc.

Family RHODOPHYLLIDACEAE

WURDEMANNIA SETACEA Harv.
Island of Juparayba, Rio de Janeiro Bay (20281 a), with *Hypnea spinella*, etc. Apparently the first record of this species from South America; type from Key West, Florida.

Family SPHAEROCOCCACEAE

HYPNEA MUSCIFORMIS (Wulf.) Lamour.
Vicinity of Bahia (19671); Island of Juparayba, Rio de Janeiro Bay (20278c); Ilha Grande, Distrito Federal, Rio de Janeiro (20395 b).

[3] KJELLMAN, F. R. *Japanska arter af slägtet* Porphyra. Bihang till Svenska Vet.-Akad. Handl. 23[4]: 1897.

HYPNEA SPINELLA (Ag.) Kütz.

Island of Coco, Rio de Janeiro Bay (20269 b); Island of Juparayba, Rio de Janeiro Bay (20281 b), with *Wurdemannia setacea*, etc.; vicinity of Bahia (21301 m).

Family DELESSERIACEAE

Cottoniella sanguinea sp. nov.

Pomegranate-purple, carmine, or Indian lake,[9] very soft, gelatinous, or mucous, gregarious or densely cespitose on other algae, 2–3 cm. long, pseudo-dichotomous, more or less decumbent and rhiziniferous near base; main axes strongly corticated, subcylindric or slightly complanate, 0.15–0.28 mm. in diameter, destitute of rhizoids above the decumbent base, cells of the cortex

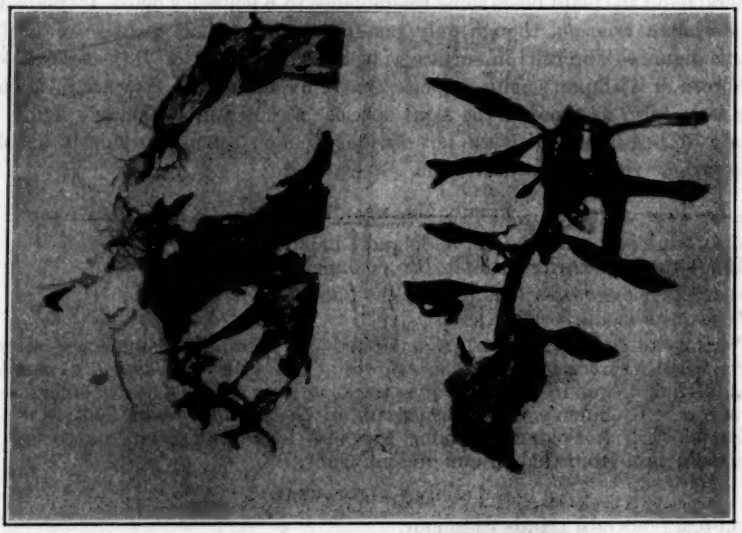

Fig. 2.—*Cottoniella sanguinea* M. A. Howe. Photograph of type specimens (*Rose & Russell* 20279), natural size.

polymorphous; corticated branches giving rise above to secund, subterete, uncorticated polysiphonioid branchlets 25–60μ broad, tapering to a monosiphonous apex, their segments mostly $\frac{1}{2}$–2 times as long as broad, the pericentral siphons four at first, soon becoming five, or four persisting, the corticated branches bearing also occasional monosiphonous branchlets; cross-section of polysiphonioid branchlets suborbicular or compressed, rarely twice as broad as high; costa wanting or very obscure; uncorticated polysiphonioid branchlets bearing secund monosiphonous filaments 0.3–0.6 mm. long, consisting of 12–20 cells, mostly 1–3 times as long as broad and bearing also occasional polysiphonioid branchlets, each of these commonly accompanied by a collateral monosiphonous filament; reproductive organs unknown.

On *Sargassum*, Island of Juparayba, Rio de Janeiro Bay, Brazil, July 17, 1915, *J. N. Rose & P. G. Russell* (20279, TYPE, and 20282 b).

[9] Colors according to RIDGWAY, *Color Standards and Color Nomenclature.*

Cottoniella sanguinea is related to *C. arcuata* Børg.,[10] known to us only from the author's description and figures, from St. Thomas of the American Virgin Islands, but it is apparently a smaller plant (2–3 cm. long *vs.* 8 cm. long), with more strongly corticated main axes, with apices of the terminal branches scarcely arcuate and with much less obvious dorsiventrality; in the older parts, cross sections commonly show five pericental siphons instead of the four of *C. arcuata*. The latter seems to be known only from a small amount of material preserved in fluid, so that no description of color is available.

Cottoniella filamentosa (M. A. Howe) Børg. (originally described as *Sarcomenia filamentosa* from the upper Florida Keys and since reported from western Cuba) differs decidedly in having much more flattened costate-alate branchlets and a pair of short alar siphons, end to end, on either margin, corresponding to each bundle of four pericentral siphons. This species was placed in the genus *Sarcomenia* with some misgivings, which were expressed at the time of its publication. It seems more in harmony with the modern idea of generic limitations among the Rhodophyceae to accept Børgesen's recently proposed genus *Cottoniella*, which now seems to include three different specific forms.

What the Guadeloupe *Polysiphonia mucosa* Crouan[11] may be we do not know except that its color is "rose carmine très vif" and that it grows a "parasite sur *Cladophora*, *Thalassia*, recuellis à la plage."

Family RHODOMELACEAE

DIGENEA SIMPLEX (Wulf.) Ag.
Vicinity of Bahia (21301 i).

BRYOTHAMNION TRIQUETRUM (S. G. Gmel.) M. A. Howe.
Vicinity of Bahia, (21301 d).

BRYOTHAMNION SEAFORTHII (Turn.) Kütz.
Vicinity of Bahia (19611 c, and 19681 a).

AMANSIA MULTIFIDA Lamour.
Vicinity of Bahia (19611 a and 21301 b).

VIDALIA OBTUSILOBA (Ag.) J. Ag.
Vicinity of Bahia (21301 l) in small quantity, with *Neurocarpus Hauckianus*, etc.

Family CERAMIACEAE

CENTROCERAS CLAVULATUM (Ag.) Mont.
Island of Coco, Rio de Janeiro Bay (20269 d); Nictheroy, Rio de Janeiro (20318 b).

Family CORALLINACEAE

CORALLINA SUBULATA Ell. & Soland.
Vicinity of Bahia (21301 e).

JANIA CAPILLACEA Harv.
Vicinity of Bahia (19609 d), with *Amphiroa brasiliana*, etc. and (19681 c).

AMPHIROA BRASILIANA Decaisne
Nictheroy, Rio de Janeiro (20317 a); vicinity of Bahia (19609 c and 21301 f).

[10] *The Marine Algae of the Danish West Indies* **2**: 333–338. *f.* 335, 336. 1919; 477–479. 1920.

[11] MAZÉ and SCHRAMM, *Essai* 262. 1870–77.

BARBADOS

September 30, 1915

CHLOROPHYCEAE

Family ULVACEAE

ULVA RIGIDA Ag. (21190 a).

Family VALONIACEAE

BOODLEA SIAMENSIS Reinb. (21186 a).

Family CLADOPHORACEAE

CHAETOMORPHA BRACHYGONA Harv. (21190 c.)

Family CODIACEAE

HALIMEDA OPUNTIA (L.) Lamour. (21187 a).

PHAEOPHYCEAE

Family FUCACEAE

SARGASSUM POLYCERATIUM Mont. (21186 b and 21188).
Fucus foliosissimus Lamour. (*nomen nudum aut seminudum*)

Family DICTYOTACEAE

DICTYOTA BARTAYRESIANA Lamour. (21186 c).

DICTYOTA CILIOLATA Kütz. (21190 b).
Dictyota ciliata J. Ag. Not *D. ciliata* Lamour.

NEUROCARPUS HAUCKIANUS (Möb.) Kuntze. On *Halimeda Opuntia* (21187 b and 21189 a).
Dictyopteris Hauckiana Möb.
Apparently the first record for the West Indies. Type from Olinda, near Pernambuco, Brazil.

RHODOPHYCEAE

Family RHODOMELACEAE

LAURENCIA PAPILLOSA (Forsk.) Grev. (21186 e).

ACANTHOPHORA MUSCOIDES (L.) Bory. (21186 d).

Family CORALLINACEAE

JANIA CAPILLACEA Harv. (21187 c).

FOSLIELLA LE JOLISII (Rosan.) M. A. Howe. On *Thalassia* (21189 b).
Melobesia Le Jolisii Rosan.

ENTOMOLOGY.—*Two new cave-beetles related to* Anophthalmus pusio *Horn.*[1] H. S. BARBER, Bureau of Entomology.

The blind carabids of our eastern limestone caves having received so little attention since the interesting discussion of the possible sources of cave life by Garman, 1892, this notice of a new form collected near Cumberland Gap, Tennessee, in 1924, by Mr. George P. Engelhardt, together with that of the only known specimen from the Luray Cavern, was outlined, but publication was delayed until the type *A. pusio* Horn could be compared. The Luray specimen, recorded as *A.*

[1] Received January 20, 1928.

tenuis by Hubbard, 1884, and discussed under that name by Garman, has stood under the name *A. pusio* in the Hubbard and Schwarz collection and in Hubbard's unpublished notes for a long time. That *tenuis* was a *lapsus* for *pusio* in Hubbard's published note is evident from his allusion to Erhart's Cave, the type locality of the latter. In Garman's discussion, reference is also made to "*pusio* from Virginia and eastern Kentucky," and comparison is made of his new species, *A. horni*, with *A. pusio* Horn from the Carter Cave.

The four forms now under consideration are: (1) *A. pusio* Horn, 1868, known from the unique type collected by Cope in Erhardt's Cave, Montgomery Co., Virginia; (2) the unique specimen found in Luray Cavern, about 140 miles northeast of the type locality of *A. pusio*, by Hubbard and Schwarz, and here named *A. hubbardi;* (3) two specimens found in English Cave on the Powell River in Tennessee, about 200 miles southwest of the type locality of *A. pusio;* and (4) *A. horni* Garman, 1892, from crevices in the rocks and in cellars of Lexington, Kentucky. It is probable that the Carter Cave form will be found specifically distinct from *A. pusio*, but the writer has seen no specimens from this lot.

Unfortunately all structures of the type of *A. pusio* were not critically examined, but it seems to agree with the other three species in differing from other American *Anophthalmus* in their small size (less than 4 mm.), depressed form, transverse pronotum, and apical elytral striation, and in having only six setae at base of mentum. They will doubtless constitute a genus distinct from the other species for which Jeannel, 1920,[2] proposed two new generic names—*Neaphaenops* for *A. tellkampfi* and *Pseudanophthalmus* for *A. menetriesi* and its allies.

The four species here considered may be distinguished in the following table:

1. Apical recurved stria shorter, occupying apical seventh or eighth of elytral length; antennae shorter, joints 5 to 10, inclusive, measuring less than 1.4 mm.....2

Apical recurved continuation of first (sutural) stria produced forward to apical fourth of elytral length, where it joins the third stria by an abrupt transverse sinuosity; the third, or subapical discal seta arising from a point at about anterior third of area thus inclosed, and forming apex of interval between second and third striae, which there unite and continue in a feeble stria, curved inward apically. Antennal joints 1 and 2 subequal in length and about a fourth shorter than joints 3 and 4, which are also equal; joints 5 to 10 longer, together measuring 1.6–1.7 mm. Length 4–4.2 mm., width 1.4–1.5 mm. English Cave, Powell River, Tennessee..... **A. engelhardti**, n. sp.

[2] JEANNEL, Bull. Soc. Entom. France **1920**: 154. 1920.

2. Antennal joints 1, 2, 3 and 4 subequal, apex of the recurved apical stria bent internally to join the third stria opposite anterior edge of subapical setigerous puncture.....3

Antennal joints 1 and 3 subequal in length, joint 2 about a fourth shorter than 3; apical stria broadly curved, but terminating in a broad, rounded shallow fossa not connected with third stria and a little in advance of subapical setigerous puncture. Length 3.3 mm., width 1.3 mm. Luray Cave, Virginia..... **A. hubbardi**, n. sp.

3. Form more depressed; first four antennal joints almost equal, joints 5 to 10 inclusive, measuring about 1.4 mm. Erhart's Cave, Montgomery Co., Virginia..... **A. pusio** Horn

Form more convex; antennal joint 2 slightly shorter and 3 slightly longer than 1, joints 5 to 10, inclusive, measuring 1.1–1.25 mm.; basal constriction of head continuous and distinct across occiput. Length 3.7–4.0 mm., width 1.3 mm. Lexington, Kentucky..... **A. horni** Garman

The type of *A. pusio* Horn, 1868,[3] preserved in the Academy of Natural Sciences, Philadelphia, has the pronotum more deeply impressed near posterior angles, causing the margins to be more strongly reflexed. No other specimen has been seen and those mentioned by Garman, 1892, from the Carter Cave of eastern Kentucky will probably prove to be a distinct species.

A. horni Garman, 1892,[4] is represented by a series of six specimens in the U. S. National Museum collection, received from its author and labeled "Lexington, Ky. 10.9.92." In the original description he records the pronotal measurements as 0.72 mm. long, 0.8 mm. wide before middle, and 0.66 mm. wide at base.

In *A. hubbardi* (=*tenuis* Hubbard, 1884,[5] lapsus for *pusio*; Garman, 1892, part) the pronotum is 0.65 mm. long, 0.81 mm. wide at apical fourth, and 0.60 mm. wide at base, the sides being feebly sinuate and almost evenly divergent from base to near apical fourth, thence strongly arcuate. The elytra are less convex, more densely pubescent with the striae marked on disc only by the feeble convexity of the intervals, although they are more deeply impressed basally. The tarsi are relatively shorter and stouter. The holotype (U. S. National Museum Cat. No. 40823) was collected more than forty years ago, an old note by Mr. H. G. Hubbard stating the "single specimen of *A. pusio* was found November 27, 1884, in Luray Cave, Page County, Virginia, among debris under a stairway and within twenty feet of an electric light." This species is more similar to *A. pusio* than to any other species known to me.

In *A. engelhardti* the pronotum is 0.82 mm. long by 0.95 mm. wide at apical third, and 0.75 mm. wide at base. The elytra are more convex and less densely pubescent, with the striae more definitely marked on disc. The more elongate antennae, more slender and elongate tarsi and larger size support the characters already given. The type and paratype (U. S. National Museum Cat. No. 40824) were collected in English Cave, Powell River, Tennessee, six miles south of Cumberland Gap, July 27, 1924, by Mr. George P. Engelhardt, after whom it is a pleasure to name the species.

[3] HORN, Trans. Amer. Entom. Soc. 2: 125. 1868.
[4] GARMAN, Science 20: 240–241. 1892.
[5] HUBBARD, Proc. Entom. Soc. Washington 1: 16. 1884

ZOOLOGY.—Ungella secta *n. gen., n. sp.; a nemic parasite of the Burmese Oligochaete (earthworm)*, Eutyphoeus rarus.[1] N. A. COBB, U. S. Department of Agriculture.

Ungella, n. gen.

Amphigonic nemas with protrusile, dorsally arcuate, hooked onchia (Fig. 1) and special cervical gland; oesophagus degenerate-diplogastroid; adults with posterior lateral pockets or "suckers;" 'm and 'f; males with two equal spicula and a gubernaculum, and an elongate pre- and post-anally ribbed bursa. Parasitic in earthworms. Proposed as type species is:

Ungella secta n. sp.

The transparent colorless cuticle is traversed by transverse striae, about one micron apart, hard to resolve even with high powers, at least in alcoholic specimens. In certain stages of the nema the striae are much more obvious and double in size. Though interrupted, the striae are not altered, on the lateral fields, where there are only faint single wings—non-existent or faint on the neck and anterior portion of the body, but somewhat readily seen along the middle of the body. The very slightly oblique longitudinal striae, due to the attachment of the musculature, are more readily visible than the transverse striae. (Fig. 3, *str longt*) Between the longitudinal striae are faint rows of dots, reminiscent of the cuticular markings of *Diplogaster*.

Fig. 1.—*Ungella secta*. Side, dorsal and end views of the same head. *M'br*, the intussusception membrane.

And here it may be said that, though valveless, the oesophagus also is reminiscent of *Diplogaster*; and that of all the free-living genera, *Diplogaster* is that to which *Ungella* seems most closely related. It is readily conceivable that the submedian duplex onchium (Fig. 1), could have been evolved from an armature such as characterizes one of the types of diplogastric pharynx.

Onchium. The duplex onchium of *Ungella* has its amalgamated roots movably imbedded in the head end of the nema backward for a distance equal to two-thirds the width of the head or more; it is assumed therefore that this represents the depth of the otherwise unarmed pharynx. The onchium, which can be exserted for the greater part of its length, is a strong refractive organ, colorless except distally, where it is yellowish; it is a conspicuous feature of the head, especially when protruded. The two equal claws of the onchium are joined rigidly in such a way as to make it impossible for them to be juxtaposed, and their internal structure makes plain that they represent the two ventrally submedian sectors of the oesophagus. Thus the onchium and its

[1] Investigation made in part at laboratories of the Bureau of Fisheries at Woods Hole, Massachusetts. Received January 23, 1928.

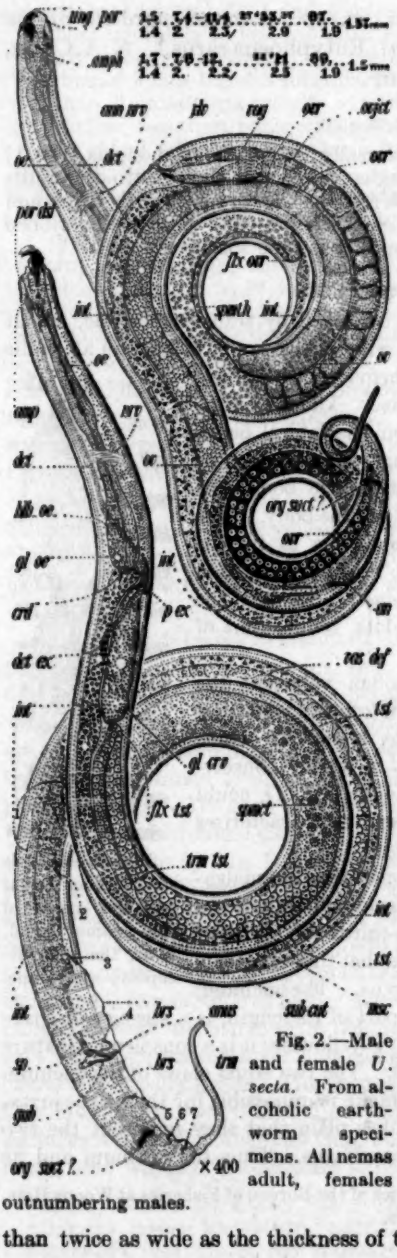

Fig. 2.—Male and female *U. secta*. From alcoholic earthworm specimens. All nemas adult, females outnumbering males.

"hilt" have the general form of the ultimate two-clawed segment of a beetle's tarsus. (See Fig. 1.) Rather weakly developed retractor muscles are attached to the amalgamated onchial apophyses. It seems not unlikely that the caudal "suckers" may also aid—as a base of resistance—in the use of the onchium, the object of which must be to claw; it must wound by clawing, hence the specific name *secta*. When the onchium is withdrawn and at rest, as in the female of Figure 2, the outer or distal parts of the two claws rest in special lateral depressions on the *outside of the front of the head* (see *concav* Fig. 1) and to that extent are not withdrawn into the head.

Oesophageal glands. The median dorsad pore in the front of the head, *por dsl*, is the exit of a large well developed *special cervical gland, gl crv*. The excretory pore of the renette, *p ex*, is farther back and ventral. There is an almost imperceptible short alteration in the oesophageal lining between the fore and after parts of the oesophagus,—probably the vestige of a median bulb. The indistinctly clavate, posterior, non-valvate, oesophageal swelling contains a single, bright, refractive, three-micron nucleus near the base in the dorsal sector, proving the presence of an *oesophageal gland*. Radial oesophageal muscles are only faintly to be seen.

Intestine. A cross-section of the intestine cuts through only about two relatively large cells. The refractive lining of the intestine often is distinctly to be seen. In the front portion of the body the wall of the intestine is hardly as thick as that of the body; here the lumen of the intestine often is more than twice as wide as the thickness of the intestinal wall.

Renette. The renette duct, *dct ex*, is distinctly refractive and nearly two microns across; it passes inward at right angles to the ventral surface and then turns backward on the left side and becomes narrower and apparently bifurcate.

Caudal "Suckers." The tissue composing the mouths of the two lateral caudal "suckers" is comparatively structureless looking, and externally partakes of the general character of the cuticle. These two large lateral openings, found on the tail of adults of both sexes, when viewed dorso-ventrally are seen to lead inward and forward into two well developed pockets or "suckers," so massive that this portion of the tail, in the median aspect appears about 50 per cent wider than the portion of the tail immediately behind (Fig. 3, *org suct*). The cavity of each organ is lined with thick striated tissue whose most obvious elements are arranged at right angles to its inner surface, which presents a very definite internal sectional contour, due to the refractiveness of this tissue; so that the whole organ is a relatively conspicuous affair. A strand (contractile?) leading forward from each "sucker" into the corresponding lateral chord is at first rather wide, then narrows (*text org suct*, Fig. 3). The "suckers" seem to make their appearance on both sexes at the last moult (Fig. 4).

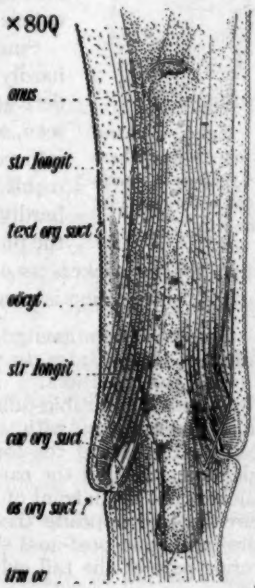

Fig. 3.—Ventral view of the post-anal region of *Ungella secta*, showing in the lower part of the figure the two lateral pockets or suckers, *cav org suct*.

Gonads. The elevated transverse vulva apparently is not very wide. Near the flexure the gonad presents a spermatheca, *spmth*, containing numerous spherical sperms of such a size that about a dozen would be required to span the body diameter. These possess refractive, faintly lobed nuclei, indicating the presence of a small number of chromosomes—probably about five. Contained in the uterus of adult females, as a rule, is a single thin-shelled, smooth egg, *ov*, about one and one-half times as long as the body is wide and about one-third as wide as long. No segmented egg has been seen in the uterus. The blind end of the ovary lies between the caudal "suckers" or somewhat farther forward. From the blind end of the ovary forward the oöcytes very soon become smaller, as if by division, and not far from the anus are arranged several abreast, and so continue, increasing meanwhile in size, for a good fraction of the distance to the vulva; thence, owing to increased size, they are arranged single file, each ovum cylindroid and somewhat longer than wide.

The male. The relatively large *gubernaculum, gub,* is single, rather shallow, nearly straight, and extends inward nearly at right angles to the ventral surface, so that its proximal end is considerably dorsad of the body axis. It appears quite as massive as the two equal spicula, and has the form of a relatively very broad, shallow, somewhat boat-like trough, deepest amidships, its depth being about one-third its length. The *long narrow bursa, brs,* presents seven *whiplash-like ribs* (1–7, Fig. 2) extending into each of the colorless, thin, glassy-looking, ventrally submedian, bursal expansions of the cuticle.

Fig. 4.—Ventral view of the suckers of *Ungella secta* just before the last moult.

Since the suckers are common to both sexes, they can hardly be considered secondary sexual organs. Figure 4, derived from one of the few immature specimens thus far seen, seems to indicate that these interesting organs come into existence at the last moult, for, just previous to the last moult, they appear immature or "embryonic." It seems hardly possible that these organs can be homologous with the phasmids; nor does it seem possible to link them with such ventral suckers as occur for instance on male Heterachids. In short, further observation is needed fully to determine their function.

Habitat: Body cavity and muscles of the earthworm, *Eutyphoeus rarus;* fide Mr. G. E. Gates, to whom the discovery of the nema is due. Locality, Prome, Burma, India.

Diagnosis: Flexible-tailed ungellas, dimensioned as shown in the formulae and illustrations, with two practically submedian, amalgamated onchia (ungellae), having the form of the final joint of a beetle's tarsus; cervical gland just behind the cardia, its outlet dorsad on the lip region; pockets or suckers not far in front of the middle of the tail; external amphids more or less circular and opposite the base of the pharynx; oviparous; males with three pre- and four post-anal slender ribs to the bursa, as shown in Figure 2; posterior part of the tail cylindroid, fine yet blunt,—in the male distinctly set off.

Only a more careful study of the nemas thus far described as parasitic in earthworms can determine the nature and limits of most of the genera and species that have been proposed for their reception.

For literature consulted see the list of Pierantoni (Boll. Soc. Nat. Napoli, 1915, p. 150–3) and Baylis & Daubney (Synopsis, 1926).